APPENDIX E- Recovery Action Cost Estimates And Schedule

Recovery Action Cost Estimates & Schedule

This table lists cost estimates (rounded to the nearest $500) and schedules (where known) for actions identified in the recovery plan. A cost estimate is not provided in the following cases:

- Baseline Action: These are actions based on programs that are already in existence and being applied to salmon conservation. Placing an action in this category does not imply that the action's current scale or extent of implementation is sufficient to achieve the desired effect. No cost estimate is prepared for actions in this category.
- To Be Determined: These are actions that have a fairly specific description and so might be sufficiently detailed to support a cost estimate, but insufficient data currently exist to estimate the costs, for one or more of the following reasons:

  (1) Information on the scale of this action is needed before a total cost can be estimated

  (2) Information on the scale and unit cost of this action is needed before a total cost can be estimated

  (3) Some or all of the costs of this action are included in the cost estimate of other actions in the table

  (4) The cost of this recovery action cannot be estimated without more detailed information on the action itself.

  Actions in this category may also be eventually assigned to the Baseline category, in which case no cost estimate would be prepared.

Unless stated otherwise, estimates of the scale of an action are taken from the recovery plan.

NOTE: The following table is presented in two parts: Part I is a summary of proposed recovery action cost estimates, and Part II is a more detailed list of proposed recovery actions and estimated costs.

PART I: SUMMARY of Proposed Recovery Action Cost Estimates		
Recovery Plan Section	**Proposed Recovery Action**	**Recovery Action Cost Estimates & Schedule**
7.1 Fisheries Management		
7.1.3 Short-Term Actions	All actions in this section are baseline actions.	Baseline Action
7.1.4 Long-Term Actions	All actions in this section are baseline actions.	Baseline Action
7.2 Habitat-related Actions		
7.2.1 Programmatic Actions		
Forest and Fish HCP	Actions in this section are mostly baseline actions. One action could have a cost estimate but is listed as To Be Determined (see detailed list of actions in Part II below).	Baseline Action
WDNR State Land HCP	All actions in this section are baseline actions.	Baseline Action
Clallam County Critical Areas Ordinance and Storm Water Management Plan	Most of the actions in this section are baseline actions.	Baseline Action
Clallam County Road Maintenance Plan	All actions in this section are baseline actions.	Baseline Action
Clallam County Shoreline Management Plan (SMP)	All actions in this section are baseline actions.	Baseline Action

PART I: SUMMARY of Proposed Recovery Action Cost Estimates		
Recovery Plan Section	**Proposed Recovery Action**	**Recovery Action Cost Estimates & Schedule**
Olympic National Park Management Plan	Most of the actions in this section are baseline actions.	Baseline Action
Olympic Coast National Marine Sanctuary Management Plan	Some of the actions in this section are baseline actions. One action could have a cost estimate but is listed as To Be Determined (see detailed list of actions in Part II below).	Baseline Action + $50,000
Washington State Department of Fish and Wildlife Hydraulic Code	All actions in this section are baseline actions.	Baseline Action
Washington State Department of Ecology	All actions in this section are baseline actions.	Baseline Action
7.2.2 Habitat Protection and Restoration-Enhancement Projects		
7.2.2.1 Sediment Reduction Projects		
7.2.2.1 Sediment Reduction Projects	This section has four recovery actions with cost estimates. One other action could have cost estimate but is listed as To Be Determined (see detailed list of actions in Part II below).	$13,750,000 + To Be Determined
7.2.2.2 Hydrologic Restoration Projects		
7.2.2.2 Hydrologic Restoration Projects	This section has two recovery actions with cost estimates. One other action could have a cost estimate but is listed as To Be Determined (see detailed list of actions in Part II below).	$1,450,000 + To Be Determined

PART I: SUMMARY of Proposed Recovery Action Cost Estimates		
Recovery Plan Section	**Proposed Recovery Action**	**Recovery Action Cost Estimates & Schedule**
7.2.2.3 Large Woody Debris (LWD) Placement Projects		
7.2.2.3.1 Broad-Scale LWD Placement Projects	This section has one recovery action with cost estimate. Two other actions could have cost estimates but are listed as To Be Determined.	$1,200,000 + To Be Determined
7.2.2.3.2 Site-Specific LWD Placement Projects	This section has one recovery action that could have a cost estimate but is listed as To Be Determined.	$4,000,000
7.2.2.4 Riparian and Floodplain Restoration Projects		
7.2.2.4.1 Broad-Scale Riparian and Floodplain Restoration Actions	This section has five recovery actions that could have a cost estimate but are listed as To Be Determined (see detailed list of actions).	See specific costs in Section 7.2.2.4.2.
7.2.2.4.2 Site-Specific Riparian and Floodplain Restoration Actions		
Site-Specific Riparian/Floodplain Action #1 (RS#15)	This section has one recovery action with a cost estimate. One other action could have a cost estimate but is listed as To Be Determined (see detailed list of actions in Part II below).	$28,000 + To Be Determined
Site-Specific Riparian/Floodplain Action #2 (RS#31)	This section has two recovery actions with a cost estimate. One other action could have a cost estimate but is listed as To Be Determined (see detailed list of actions in Part II below).	$179,000 + To Be Determined

PART I: SUMMARY of Proposed Recovery Action Cost Estimates		
Recovery Plan Section	**Proposed Recovery Action**	**Recovery Action Cost Estimates & Schedule**
Site-Specific Riparian/Floodplain Action #3 (RS#31)	This section has three recovery actions with a cost estimate. One other action could have a cost estimate but is listed as To Be Determined (see detailed list of actions in Part II below).	$56,500 + To Be Determined
Site-Specific Riparian/Floodplain Action #4 (RS#31)	This section has three recovery actions with a cost estimate. One other action could have a cost estimate but is listed as To Be Determined (see detailed list of actions in Part II below).	$97,000 + To Be Determined
Site-Specific Riparian/Floodplain Action #5 (RS#31)	This section has two recovery actions with a cost estimate. One other action could have a cost estimate but is listed as To Be Determined (see detailed list of actions in Part II below).	$23,500 + To Be Determined
Site-Specific Riparian/Floodplain Action #6 (RS#30)	This section has one recovery action (see detailed list of actions in Part II below).	$50,000
7.2.2.5 Spawning Habitat Restoration and Enhancement Projects		
Spawning Habitat Restoration and Enhancement Projects	This section has three recovery actions that could have a cost estimate but is listed as To Be Determined (see detailed list of actions in Part II below).	To Be Determined
7.2.2.6 Conservation Easements and Land Acquisition		
Conservation Easements and Land Acquisition	This section has one recovery action with a cost estimate. One other action could have a cost estimate but is listed as To Be Determined (see detailed list of actions in Part II below).	$25,000,000 + To Be Determined

PART I: SUMMARY of Proposed Recovery Action Cost Estimates		
Recovery Plan Section	**Proposed Recovery Action**	**Recovery Action Cost Estimates & Schedule**
7.3 Hatchery Supplementation Actions		
7.3.1 Short-term Hatchery Supplementation Actions (Umbrella Creek and Big River Supplementation Programs)	This section has seven recovery actions with a cost estimate. One other action is a Baseline Action and another action could have a cost estimate but is listed as To Be Determined (see detailed list of actions). (Note: Makah RMP Research, Monitoring and Evaluation Actions have been included in this section.)	Baseline Action $2,916,500 over 12 years + To Be Determined
7.3.2 Long-Term Hatchery Supplementation Actions		
7.3.2.1 Potential Long-Term Enhancement Actions	This section has five recovery actions that could have a cost estimate but are listed as To Be Determined (see detailed list of actions in Part II below).	To Be Determined
7.4 Predation-Related Recovery Actions	This section has seven recovery actions that could have a cost. Six are listed as To Be Determined (see detailed list of actions in Part II below).	$50,000 + To Be Determined
7.5 Research, Monitoring, and Adaptive Management Actions	This section has seven recovery actions that could have a cost but are listed as To Be Determined (see detailed list of actions in Part II below).	To Be Determined
7.6 Public Education Actions	This section has seven recovery actions (see detailed list of actions in Part II below).	$170,000

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
7.1 Fisheries Management Actions		
7.1.1 Short-Term Actions		
7.1.3.1 Freshwater Fisheries	All parties will continue implementation of current ONP, WDFW, and tribal fishing regulations that prohibit the harvest and retention of Lake Ozette sockeye salmon.	Baseline Action
7.1.3.2 Marine Area Fisheries	All parties will continue current marine fishing regimes that limit the likelihood for substantial harvest impacts to Ozette Lake sockeye salmon.	Baseline Action
7.1.4 Long-Term Actions		
7.1.4.1 Freshwater Fisheries	NMFS will work with the Tribes and WDFW within the ESA, NEPA, U.S. v. Washington forums, and with the public to evaluate any specific harvest plans proposed within the watershed prior to making formal decisions.[i]	Baseline action
7.1.4.2 Marine Area Fisheries	Fisheries directed at other sockeye salmon populations and fish species in U.S. marine fishing areas will continue to be regulated over the long term to reduce incidental harvest impacts to juvenile and adult sockeye salmon originating from Lake Ozette.	Baseline action
7.2 Habitat-related Actions		
7.2.1 Programmatic Actions		

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
Forest and Fish HCP	Consistent with the FPHCP and its incidental take permit, the Washington State Department of Natural Resources (WDNR) will maintain sufficient compliance and enforcement staff to enforce forest practice regulations within the Lake Ozette watershed.[ii]	Baseline Action
	WDNR will produce annual reports on FPHCP compliance, per HCP requirements. NMFS will work closely with WDNR to address and resolve perceived non-compliance issues.[iii]	Baseline Action
	WDNR will coordinate and seek funding for FPHCP monitoring and adaptive management activities that complement implementation of recovery plan research, monitoring and adaptive management activities.[iv]	Baseline Action
Forest and Fish HCP, cont.	Based on availability of funding and other resources, WDNR will provide incentives for timber companies to accelerate, or, with approval, modify FPHCP practices to improve the certainty of restoring watershed processes sooner by, for example, leaving larger tributary buffers, upgrading roads, speeding road improvements, removing unneeded roads consistent with the FPHCP, increasing rotation lengths, or other forestry management options. Special emphasis should be given to carrying out these measures in Umbrella Creek sub-watershed.	To Be Determined
WDNR State Land HCP	WDNR will continue annual reporting on forest practices covered by the WDNR HCP and consider including the Ozette watershed in WDNR's statewide HCP effectiveness monitoring.	Baseline Action

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
	Consistent with the WDNR HCP and its incidental take permit, WDNR will maintain sufficient compliance and enforcement staff to enforce forest practices regulations within the Lake Ozette watershed.	Baseline Action
	WDNR is encouraged to implement lessons learned from effectiveness monitoring in other basins to promptly improve implementation of the WDNR HCP in Ozette.	Baseline Action
	WDNR will coordinate HCP monitoring and adaptive management activities with implementation of recovery plan research, monitoring and adaptive management activities.	Baseline Action
Clallam County Critical Areas Ordinance and Storm Water Management Plan	Clallam County will enforce all County rules pertaining to small landowners along Big River. Specifically, zoning laws, critical areas ordinances, development in the 100-year floodplain and/or CMZ.	Baseline Action
	Clallam County will enforce state laws restricting cattle assess to rivers to protect water quality.	Baseline Action
	Clallam County will implement county critical areas ordinance and storm water management rules.	Baseline Action
	Clallam County will enforce county zoning laws limiting septic tanks that are hydrologically connected to water courses (i.e., leach field draining directly into river).	Baseline Action

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
	Clallam County will enforce Washington State Water Right Laws that limit exempt wells to less than 5000gpd.	Baseline Action
Clallam County Critical Areas Ordinance and Storm Water Management Plan, cont.	Clallam County will enforce Washington State Water Right Laws that limit the location of water withdrawals (i.e., illegal surface water diversions). Accurately delineate floodplain and channel migration zones.	Baseline Action
	Clallam County will protect floodplains and channel migration zones from development and incompatible land use activities through application of the WDFW hydraulic code and county land use regulations.	Baseline Action
	NMFS will work with Clallam County, ONP, private timber companies, WDNR, Tribes, and other interested parties to investigate various potential land conversion development scenarios and the resulting potential impact on the viability of Lake Ozette sockeye salmon. Based on this analysis, these parties will identify land use and management options that Clallam County can implement to address future potential land conversion threats to Lake Ozette sockeye.	Baseline Action
	Clallam County will carry out an analysis of forest land conversion in the watershed. Based on this analysis, the County will identify land use and management options that could be implemented by the County to protect watershed processes and functions from potential threats of future forest land conversion. The County will implement a preferred option, based on its resources and authority, to: (1) restore natural sediment production; (2) restore hydrologic processes and natural hydrologic variability; (3) and maintain and protect the lake and tributary riparian forests.	Baseline Action

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
Clallam County Road Maintenance Plan	Clallam County will adhere to Regional Road Maintenance Endangered Species Act Program Guidelines as per 4(d) Rule protections.	Baseline Action
Clallam County Shoreline Management Plan (SMP)	Clallam County will review and revise permit administrative procedures to integrate SMP administration with other regulatory processes and improve efficiency and complete a thorough inventory of the shorelines within county jurisdiction to characterize shoreline ecological processes and functions.	Baseline Action[v]
Olympic National Park Management Plan	Olympic National Park (ONP) will implement its General Management Plan within the ONP boundaries in the Lake Ozette watershed.	Baseline Action
	ONP will continue to implement its policies, regulations, site plans, and specific actions in the Lake Ozette watershed based on the General Management Plan.	Baseline Action
	ONP will control exotic and invasive plants using the National Park Service's Exotic Plant Management Team within the ONP's boundary in the Lake Ozette watershed.	Baseline Action
	ONP will continue to implement its Wilderness Management policies, protections, and regulations, particularly to maintain and protect riparian habitat.	Baseline Action
	ONP will continue to implement its Front Country Area policies and protections within the Lake Ozette watershed.	Baseline Action

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
	ONP will continue to implement its Scenic Easement policy within the Lake Ozette watershed.	Baseline Action
	NMFS will identify specific ways to cooperate with ONP to fund and implement sockeye recovery plan actions through research partnerships, management actions, and communication with the public.	Baseline Action
	NMFS will work with ONP, Clallam County, private timber companies, WDNR, Tribes and other interested parties to analyze different potential forest land conversion development scenarios and the potential impact on the viability of Lake Ozette sockeye salmon. Based on this analysis, the parties will identify land use and management options to protect watershed processes and functions to prevent potential future land use conversion threats.	Baseline Action
Olympic Coast National Marine Sanctuary Management Plan	The Olympic Coast National Marine Sanctuary (OCNMS) will continue to implement its Management Plan, particularly as it relates to nearshore habitat management and research activities.	Baseline Action
	The OCNMS will identify nearshore habitat data and research needs for sockeye recovery that may be addressed in cooperation with the Olympic Marine Sanctuary research programs.	Baseline Action
	The OCNMS will seek funding to carry out cooperative research and management actions identified in Chapter 8: Research, Monitoring, and Adaptive Management, with the Sanctuary, NMFS' Northwest Fisheries Science Center and other interested parties or institutions.	Baseline Action
	The OCNMS will share information and data collected by the Marine Sanctuary with parties implementing the Lake Ozette Sockeye Recovery Plan.	Baseline Action

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
	The OCNMS will cooperate and seek funding for public education and outreach materials and activities to promote public awareness about sockeye recovery.	$50,000 (total, years 1-10)
Washington State Department of Fish and Wildlife Hydraulic Code	The Washington State Department of Fish and Wildlife (WDFW) will continue to implement and enforce the WDFW hydraulic code, with particular attention to gravel mining, fish passage projects, and culvert replacement projects.	Baseline Action
	As per WAC 220-11-010, the WDFW will review each application for a Hydraulic Project Approval (HPA) on an individual basis and therefore require a site visit to inspect proposed job site for every HPA application to determine site-specific issues and technical provisions necessary for the protection of fish life and fish habitat.	Baseline Action
	The WDFW will encourage its fisheries enforcement to prioritize habitat issues and strictly enforce WDFW hydraulic code.	Baseline Action
Washington State Department of Ecology	The WDOE will assess statewide water quality and identify water bodies that fail to meet water quality standards.	Baseline Action

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
7.2.2 Habitat Protection and Restoration-Enhancement Projects		
7.2.2.1 Sediment Reduction Projects		
7.2.2.1Sediment Reduction Projects	Quantitatively assess sediment production impacts from logging (gully creation, debris flows, landslides), road building, large woody debris (LWD) removal, and other land use activities in Priority Subbasins I, II, and III; develop program to eliminate and/or reduce land use-related sediment inputs.	$1,350,000 (Total, years 1-4) + $5,500,000 ($500K annually, years 5-15)[vi]
	Implement rigorous sediment reduction and retention program designed to reduce coarse and fine sediment delivery to the Ozette River (see Sediment Processes).	
	Use the results of subbasin-scale sediment budgets to define the relative contribution of different sediment sources and target specific sites for restoration activities.	
	Develop voluntary comprehensive "green" forestry program at the landscape scale that promotes ecosystem function and watershed process recovery (*e.g.* Forest Stewardship Council Certification); research programs and identify potential voluntary forestry program options to achieve sockeye recovery goals.	$100,000

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
	Reconnect floodplains in Priority I and II Subbasins by reintroducing LWD to all tributaries to improve floodplain connectivity and sediment deposition/storage.	$6,750,000, time scale unknown[vii]
	Plant or under-plant conifer riparian forests in fields and disturbed hardwood zones to increase bank rooting strength, increase hydrologic roughness, and aid in sediment storage / deposition	To Be Determined
	Eradicate non-native plants (i.e., knotweed) in the riparian zone and replace with native species more effective at protecting soil and banks	$50,000
7.2.2.2 Hydrologic Restoration Projects		
7.2.2.2 Hydrologic Restoration Projects	Quantitatively assess hydrologic impacts from land use and LWD removal activities and develop a distributed hydrologic model calibrated for each tributary in conjunction with Ozette River hydraulic model to prioritize actions needed to improve natural hydrologic functions where needed.	$500,000, time scale unknown[viii]
	Remove and/or disconnect hydrologically connected road systems via road decommissioning (full removal), abundant road cross-drain installation, and adequate culvert sizes at tributary crossings to ensure passage of LWD, sediment and water at the 100 yr RI flood.	To Be Determined
	As recommended by modeling results, add LWD to the Ozette River to restore natural hydraulic backwater condition and maintain the natural range of variability of lake levels.	$950,000, time scale unknown[ix]

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
7.2.2.3 Large Woody Debris (LWD) Placement Projects		
7.2.2.3.1 Broad-Scale LWD Placement Projects	Reconnect floodplains by reintroducing LWD to all tributaries to improve floodplain connectivity, water retention, and peak flow attenuation.	To Be Determined
	Conduct modeling studies regarding how to restore natural hydraulic backwater condition and maintain the natural range of variability of lake levels.	To Be Determined
	Reintroduce LWD into the lower Ozette River so as to prevent/block seal migrations into Lake Ozette and provide cover for migrating Ozette sockeye to avoid predation.	$1,200,000, time scale unknown[x]
	Add LWD accumulations in the mainstem of Umbrella Creek to re-activate floodplain where disconnected and store suitably sized spawning gravels where absent (see below).	See site-specific actions below in 7.2.2.3.2.
7.2.2.3.2 Site-Specific LWD Placement Projects	Within Umbrella Creek, several channel segments have been identified where LWD conditions are poor and suitable spawning substrate sizes are absent due to degraded channel conditions. Within these wood-starved reaches, LWD should be reintroduced with the intent to stabilize the channel and store suitably sized spawning gravels. (Cost based on installing five log jams.)	$4,000,000

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
7.2.2.4 Riparian and Floodplain Restoration Projects		
7.2.2.4.1 Broad-Scale Riparian and Floodplain Restoration Actions	Conduct a high resolution, detailed survey of the lake shoreline and riparian zone documenting non-native plant species. In cooperation with ONP, develop program to eradicate non-native, invasive plant species.	To Be Determined
	Plant or under-plant conifer riparian forests in fields and disturbed hardwood zones	See specific costs in 7.2.2.4.2 below.
	Within Lake Ozette tributaries, eradicate non-native vegetation.	See specific costs in 7.2.2.4.2 below.
	Reconnect floodplains by reintroducing LWD to all tributaries where LWD is deficient and floodplain connectivity is impaired in order to improve floodplain connectivity, sediment storage, water retention, and peak flow attenuation	To Be Determined
	Relocate county road where road affects floodplain connectivity or reduces functionality of riparian processes	See specific costs in 7.2.2.4.2 below.
7.2.2.4.2 Site-Specific Riparian and Floodplain Restoration Actions		
Site-Specific Riparian/Floodplain Action #1 (RS#15)	Plant native conifer tree species along the right bank of the Ozette River. Establish a 200 ft wide riparian forest where feasible. Maintain planting until trees are free to grow.	$28,000, time scale unknown[xi]

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
	Remove or relocate unneeded infrastructure within a 200 foot distance of river's bankfull edge	To Be Determined
Site-Specific Riparian/Floodplain Action #2 (RS#31)	Relocate Hoko-Ozette Road out of the immediate riparian-floodplain of the Big River. In addition to relocation, the road should be constructed so that it doesn't hinder flood water movement between Big River and Trout Creek.	$150,000, time scale unknown[xii]
	Remove or relocate unneeded infrastructure within a 200 foot distance of river's bankfull edge	To Be Determined
	In addition to relocating the Hoko-Ozette Road, other road segments should be considered for removal and reconstruction: Swan Bay Road (273 meters of road) reengineered and the road elevated on a permeable road prism; Old railroad grade/unused road (176m), removal; Two old logging spurs (88 and 46 meters), removal.	$29,000, time scale unknown[xiii]
Site-Specific Riparian/Floodplain Action #3 (RS#31)	Plant the appropriate mix of native conifer and deciduous tree species in pastures; establish a 200 ft wide riparian forest where feasible; this may require property acquisition or a conservation easement to compensate the landowner; maintain plantings until trees are free to grow (RS#29).	$23,000, time scale unknown[xiv]
	If cattle are going to graze in the remaining pasture, then a fence should be installed to prevent their access to the river.	$10,500, time scale unknown[xv]
	Remove or relocate unneeded infrastructure within a 200 foot distance of river's bankfull edge: 1,600 feet of road to be removed and 685 feet of road relocation.	$23,000, time scale unknown[xvi]

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
	If downstream infrastructure is relocated and floodplain processes restored, then this stream reach should receive a LWD treatment aimed at reconnecting the channel and floodplain.	To Be Determined
Site-Specific Riparian/Floodplain Action #4 (RS#31)	Plant the appropriate mix of native conifer and deciduous tree species in pastures; establish a 200 ft wide riparian forest where feasible (this may require property acquisition and/or conservation easements to compensate the landowners – see Land Acquisition and Conservation Easements section); maintain plantings until trees are free to grow	$55,000, time scale unknown[xvii]
	If cattle are going to graze in the remaining pastures, then a fence should be installed to prevent their access to the river.	$9,000, time scale unknown[xviii]
	Remove or relocate unneeded infrastructure within a 200 foot distance of river's bankfull edge: 2,900 feet of road that could be removed and 760 feet of road relocation.	$33,000, time scale unknown[xix]
	If downstream infrastructure is relocated and floodplain processes restored, then this stream reach should receive a LWD treatment aimed at protecting banks from excessive erosion; however, several homes are located along this stream reach, and floodplain connectivity using LWD introductions is not likely feasible.	To Be Determined

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
Site-Specific Riparian/Floodplain Action #5 (RS#31)	Plant the appropriate mix of native conifer and deciduous tree species; establish a 200 ft wide riparian forest where feasible (this may require property acquisition and/or conservation easements to compensate the landowners – see Land Acquisition and Conservation Easements section); maintain plantings until trees are free to grow	$18,000, time scale unknown[xx]
	If cattle are going to graze in the remaining pasture, then a fence should be installed to prevent their access to the river.	$5,500, time scale unknown[xxi]
	Remove or relocate unneeded infrastructure within a 200 foot distance of rivers bankfull edge	To Be Determined
	If downstream infrastructure is relocated and floodplain processes restored, then this stream reach should receive a LWD treatment aimed at protecting banks from excessive erosion.	To Be Determined
Site-Specific Riparian/Floodplain Action #6 (RS#30)	Continue efforts by the Makah Tribal, Clallam County, and ONP noxious weed programs, focusing on eradicating noxious weeds and reestablishing native riparian forests with the help of private landowners and others.	$50,000
7.2.2.5 Spawning Habitat Restoration and Enhancement Projects		
Spawning Habitat Restoration and Enhancement Projects	Develop comprehensive program to restore beach spawning habitat at Umbrella Beach (in addition to Umbrella Creek recovery efforts); upon habitat recovery implement an experimental sockeye re-introduction program.	To Be Determined

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
	Identify other potential sockeye beach spawning habitats and attempt re-introducing sockeye salmon in conjunction with habitat and watershed process rehabilitation efforts.	To Be Determined
	Within sockeye spawning tributaries such as Umbrella Creek, implement LWD placement concepts described in Section 7.2.2.3.	See Section 7.2.2.3.2.
	Develop a shoreline habitat restoration plan, including vegetation removal, gravel cleaning, and beach restoration actions at selected shoreline project sites.	To Be Determined
7.2.2.6 Conservation Easements and Land Acquisition		
Conservation Easements and Land Acquisition	Where interest, funding, and willing sellers exist, purchase land within Ozette watershed and restore and actively manage for old-growth unroaded conditions. The priority for such subbasin conservation is as follows: Umbrella Creek; Big River; Tier II subbasins; Tier III subbasins	$25,000,000, time scale unknown[xxii]
	Develop conservation easements with willing landowners to promote ecosystem function and watershed process recovery with management objectives focused on aquatic ecosystem restoration.	To Be Determined[xxiii]
7.3 Hatchery Supplementation Actions		
7.3.1 Short-term Hatchery Supplementation Actions (Umbrella Creek and Big River Supplementation Programs)		

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
7.3.1.1 Sockeye Salmon Broodstock Selection and Collection Actions	Adult sockeye salmon used as broodstock for the tributary hatchery programs will be trapped in Umbrella Creek. Up to 200 adult sockeye salmon will be trapped and retained each year using a weir in lower creek. Broodstock will be collected from October through December, encompassing the spawner entry period. Sockeye salmon broodstock will be collected proportional to the timing, weekly abundance, and duration of the total return to the creek. Fish will be transferred to Umbrella Creek Hatchery for spawning, or spawned at the point of capture.	$885,000 over 12 years + $87,000 one-time cost[xxiv]
7.3.1.2 Sockeye Salmon Broodstock Spawning Actions	Gametes will be collected from brood fish for transport to iso-incubation locations at Makah NFH or Educket Hatchery. Approximately 305,000 unfertilized eggs will be collected each year for incubation.	$17,000 over 12 years[xxv]
7.3.1.3 Juvenile Sockeye Salmon Rearing and Release Actions	Eggs to be incubated at the Umbrella Creek and Big River sites are otolith marked using standard thermal marking procedures. Upon swim-up (mid-April to late May), fry will be reared on an artificial or live feed diet. A proportion of the mass otolith-marked fry produced at Umbrella Creek Hatchery will also marked with an adipose fin clip. Up to 80,000 fingerlings will be released each year into Umbrella Creek between late-May and early July. Up to 140,000 otolith-marked eyed eggs will be transferred for incubation early February with fry released each year into Big River from late April to late May. Half of the annual Big River RSI sockeye fry production will be released as otolith-marked, unfed fry or as “early” fed fry. The remaining half of the annual hatchery production will be reared for release in the early summer as fingerlings. A proportion the fingerlings produced at the Big River site will receive an adipose fin clip mark to augment the otolith mark.	$724,500 over 12 years + $41,500 one-time costs[xxvi]

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
Administrative Costs for 7.3.1.1, 7.3.1.2, and 7.3.1.3 tasks	Administrative Costs for 7.3.1.1, 7.3.1.2, and 7.3.1.3 tasks	$409,000 over 12 years[xxvii]
7.3.1.4 Hatchery-Origin Adult Sockeye Salmon Disposition Actions	The short-term hatchery approach under this plan will carry forth plans for the disposition of adult sockeye salmon specified in the Lake Ozette sockeye salmon HGMP.	Baseline Action
Makah RMP Research, Monitoring and Evaluation Actions	Ozette River Adult Counting Weir Operation – (Quote description included in recovery plan)	$27,000 annually + $9,500 one-time costs[xxviii]
	Ozette River Juvenile Out-migrant Trap Operation – (Quote description included in recovery plan)	$17,000 annually + $28,500 initial costs[xxix]
	Spawning Ground Escapement Surveys – (Quote description included in recovery plan). (and also include:) A representative sample of adult sockeye salmon returning to the all spawning areas will be sampled for otoliths and fin clips to compare hatchery-origin unfed fry, early fed fry, and fingerling survival rates and to identify stray and contribution rates for hatchery and natural-origin sockeye salmon.	$15,500 annually + $500 one-time costs[xxx]
Administrative Costs for RMP RM&E tasks	Administrative Costs for RMP RM&E tasks	To Be Determined
7.3.2 Long-term Hatchery Supplementation Actions		
7.3.2.1 Potential Long-Term Enhancement Actions		

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
7.3.2.1.1 Termination or Continuation of Tributary Supplementation Programs	Terminate or continue the supplementation programs on Umbrella Creek and Big River.	To Be Determined
7.3.2.1.2 Natural Colonization of Beaches	Forgo use of enhancement, in particular, artificial propagation, as a means to recover healthy Ozette Lake sockeye salmon aggregations on the spawning beaches; a continuation of the short-term approach.	To Be Determined
7.3.2.1.3 Mechanical Improvement of Beach Spawning Areas	Mimic the effects of mass spawning sockeye by manually or mechanically coarsening beach spawning substrate, reducing the percentage of fine materials (e.g., silt and sand).	To Be Determined
7.3.2.1.4 Creation of New Beach Spawning Locations and Stock Introduction	Create new beach spawning locations in Ozette Lake, followed by natural colonization, or seeding of the new locations using hatchery methods.	To Be Determined
7.3.2.1.5 Supplementation of Beach Spawning Aggregations	Use artificial propagation methods to supplement of beach spawning sockeye salmon aggregations.	To Be Determined
7.4 Predation-Related Recovery Actions	Create an incentive program, as appropriate within NPS regulations, to encourage or require lethal take of largemouth bass and other non-native fish species.	To Be Determined

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
	Create fishing regulations that will limit take of native species while maximizing the removal of non-native species.	To Be Determined
	Develop a management plan for northern pikeminnow, based on field assessments of the species' impact on sockeye salmon survival and productivity.	To Be Determined
	Work with NMFS and other appropriate agencies to study impacts of marine mammals and river otters on sockeye salmon, particularly on beach spawning grounds. Based on this information, develop a NMFS-sanctioned plan to address these impacts through a variety of predator control measures being tested and used in the NMFS Northwest Region.	$50,000
	Working in coordination with NMFS, ONP, and other agencies, analyze the impacts of seals and sea lions on sockeye salmon and identify options to minimize these impacts, including reinstating ceremonial and subsistence hunting of seals and sea lions in Tribal Usual and Accustomed hunting and fishing areas.	To Be Determined
	Modify sockeye adult enumeration techniques at the Ozette River weir to reduce any predation mortality on adult and juvenile sockeye.	To Be Determined

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
	Implement research and monitoring actions proposed in Chapter 8 to analyze fishing regulations, predator-prey interactions, and predation at all life stages for beach spawners.	To Be Determined
7.5 Research, Monitoring and Evaluation	Research, monitoring, and adaptive management actions will be carried out based on the research, monitoring, and adaptive management plan that will be developed in 2008 after the Lake Ozette Sockeye Recovery Plan is adopted by NMFS. (See Chapter 8.)	To Be Determined
7.6 Public Education and Outreach	Develop and implement an education and outreach program directed at fishers and the general public regarding the negative impacts of non-native fish and plants on native species, habitat, and the Lake Ozette ecosystem.	$50,000
	In cooperation with co-sponsors, produce a 3-5 page summary brochure or handout describing the key parts of the Lake Ozette Sockeye Recovery Plan and highlighting the recovery actions that can be carried out by the public and landowners. Distribute the brochure to the public.	$10,000
	Develop a clearinghouse of information about recovery plan implementation.	Baseline Action

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
	In cooperation with Clallam County, local Soil Water and Conservation Districts, and the Natural Resource Conservation Service, work with landowners in the watershed to provide information and help identify appropriate recovery actions on landowner property.	$10,000
	Produce educational materials that can be used in the local schools, community colleges, and community centers to educate children about needed recovery actions.	$25,000
	Develop cooperative educational and outreach programs with existing organizations and nonprofit groups to include information about sockeye recovery in their materials.	$25,000
	Develop exhibit materials that can be used at fairs, festivals, or other venues to communicate the recovery actions needed to protect and restore sockeye salmon.	$5,000
	Work with Olympic National Park staff to develop materials, posters, and display boards to educate the public visiting Lake Ozette about the need to recover sockeye salmon and the recovery actions being carried out within the Park.	$25,000

PART II: DETAILED LIST of Recovery Action Cost Estimates		
Recovery Plan Section	**Recovery Action**	**Recovery Action Cost Estimates & Schedule**
	Seek funding to carry out the proposed education and outreach actions. Develop a clearinghouse of information on funding sources. Support local entities, landowners, and Tribes to seek funding for recovery actions.	Baseline
	Develop public education information that can be posted on the NMFS, Olympic National Park, Olympic Coast National Marine Sanctuary, and Clallam County's NOPLE web sites.	Baseline
	Carry out briefings and presentations to civic, business, trade, environmental, and conservation organizations.	Baseline + $10,000
	Lead seasonal tours of the watershed so the public can observe spawning sockeye salmon and visit recovery project restoration sites.	$10,000

Endnotes

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i. Text in the recovery plan is the following:

> NMFS will work with the Tribes and WDFW within the ESA, NEPA, U.S. v. Washington forums, and with the public to evaluate any specific harvest plans proposed within the watershed prior to making formal decisions. Fisheries directed at other fish species in the Lake Ozette basin will continue to be regulated over the long term to reduce incidental harvest impacts to juvenile and adult sockeye salmon. To reduce piscivorous fish predation risks to juvenile sockeye salmon, recreational fisheries designed to remove and eradicate non-native fish species will continue to be promoted (RS#3). No-bag-limit fisheries directed at largemouth bass and yellow perch will be promulgated by ONP and WDFW, where and when appropriate.

ii. Text in the recovery plan is the following:

> Consistent with the FPHCP and its incidental take permit, the state Department of Natural Resources will maintain sufficient compliance and enforcement staff to enforce forest practice regulations within the Lake Ozette watershed. These activities should be carried out consistent with applicable local, state, and Federal laws and the stated objectives and intents of the FPHCP.

iii. Text in the recovery plan is the following:

> WDNR will produce annual reports on FPHCP compliance, per HCP requirements. NMFS will work closely with WDNR to address and resolve perceived non-compliance issues. WDNR is encouraged to seek involvement of representatives from the Lake Ozette Steering Committee to investigate and address compliance issues.

iv. Text in the recovery plan is the following:

> WDNR will coordinate and seek funding for FPHCP monitoring and adaptive management activities that complement implementation of recovery plan research, monitoring and adaptive management activities. Coordinate these activities closely with FPHCP Cooperative Monitoring, Evaluation and Research (CMER), recovery plan, ONP, tribal, and county research, monitoring and adaptive management actions.

v. Text in the recovery plan is the following:

> Clallam County will review and revise permit administrative procedures to integrate SMP administration with other regulatory processes and improve efficiency. Complete a thorough inventory of the shorelines within county jurisdiction to characterize shoreline ecological processes and functions. The inventory supports the development of SMP policies and regulations

designed to achieve no net loss of ecological functions, and serve as the basis of a shoreline restoration plan for the county. Inventory also creates an overlay of shoreline structures and modifications with biological features to identify impairments to ecological functions. WAC 173-20-130 identifies Ozette Lake as a lake of statewide significance.

Costs for SMP update may be funded by special appropriation by Washington State Legislature and/or grants administered by the Wa. Dept. of Ecology SEA program

vi. Source: Memorandum from Mike Haggerty, *Lake Ozette Sockeye Action Table April 12 2007*, May 15, 2007.

vii. Source: Memorandum from Mike Haggerty, *Lake Ozette Sockeye Action Table April 12 2007*, May 15, 2007. This estimate covers Priority I and II tributary sub-basins and does not include the Ozette River, which is covered below.

viii. Source: Memorandum from Mike Haggerty, *Lake Ozette Sockeye Action Table April 12 2007*, May 15, 2007. This estimate assumes the work will be done in conjunction with sediment assessment described in section 7.2.2.1 of the recovery plan.

ix. Source: Memorandum from Mike Haggerty, *Lake Ozette Sockeye Action Table April 12 2007*, May 15, 2007. This figure is based on a rough estimate of the scale and scope of the proposed action.

x. Source: Memorandum from Mike Haggerty, *Lake Ozette Sockeye Action Table April 12 2007*, May 15, 2007. This figure is based on a rough estimate of the scale and scope of the proposed action.

xi. Estimate: 11.1 acres @ $2,500/acre. Source: NWFSC, Memorandum on Habitat Restoration Action Cost Estimates, June 2007.

xii. Estimate: 9800 ft of road @ $80,000/mile. Source: NWFSC, Memorandum on Habitat Restoration Action Cost Estimates, June 2007.

xiii. Estimate: 1913 ft of road @ $80,000/mile - unit cost estimated from OWEB data. Source: NWFSC, Memorandum on Habitat Restoration Action Cost Estimates, June 2007.

xiv. Estimate: 9.1 acres @ $2,500/acre. Source: NWFSC, Memorandum on Habitat Restoration Action Cost Estimates, June 2007.

xv. Estimate: 4250 ft of exclusion fencing @ $13,000/mile. Source: NWFSC, Memorandum on Habitat Restoration Action Cost Estimates, June 2007.

xvi. Estimate: 1600 ft of road decommissioning @ $40K/mile + 685 ft of road relocation @ $80K/mile. Source: NWFSC, Memorandum on Habitat Restoration Action Cost Estimates, June 2007.

xvii. Estimate: 21.7 acres @ $2,500/acre. Source: NWFSC, Memorandum on Habitat Restoration Action Cost Estimates, June 2007.

xviii. Estimate: 3680 ft of exclusion fencing @ $13,000/mile. Source: NWFSC, Memorandum on Habitat Restoration Action Cost Estimates, June 2007.

xix. Estimate: 1600 ft of road decommissioning @ $40K/mile + 685 ft of road relocation @ $80K/mile. Source: NWFSC, Memorandum on Habitat Restoration Action Cost Estimates, June 2007.

xx. Estimate: 7.1 acres @ $2,500/acre. Source: NWFSC, Memorandum on Habitat Restoration Action Cost Estimates, June 2007.

xxi. Estimate: 2250 ft of exclusion fencing @ $13,000/mile. Source: NWFSC, Memorandum on Habitat Restoration Action Cost Estimates, June 2007.

xxii. Estimate: 10,000 acres (time scale unknown) @ $2,500/acre. Source: Memorandum from Mike Haggerty, *Lake Ozette Sockeye Action Table April 12 2007*, May 15, 2007.

xxiii. Conservation easements typically cost 30-70% of acquisition price. Using a price of $2,500/acre (source: Memorandum from Mike Haggerty, *Lake Ozette Sockeye Action Table April 12 2007*, May 15, 2007), this would put easement costs at ~$1,250/acre.

xxiv. Estimate: Weir placement and removal: $142,560 (3 FTE @ $198/day*20 days *12 years); Weir operation: $742,560 (4 FTE @ $170/day *90days *12 years); Materials: 1) Initial purchase & installation: $76,800; 2) Repair materials, Petersen tags, equipment & consumables, otolith analysis contract: $10,650. Source: Communications with Tim Tynan, Joseph Hinton, and Caroline Peterschmidt, 16 May 2007.

xxv. Estimate: Broodstock holding and spawning: $9,216 (4 FTE @ $32/day * 6 days x 12 years); Materials: 1) Spawn & sampling supplies and equipment: $7,800 ($650 annually * 12 years); 2) MNFH iso-building set-up and annual operating costs: Unknown. Source: Communications with Tim Tynan, Joseph Hinton, and Caroline Peterschmidt, 16 May 2007.

xxvi. Estimate: Sockeye rearing and release: $504,000 (2.5 FTE @ $112/day * 150 days * 12 years); Sockeye marking: $220,320 (6

FTE @$204/day * 15 days * 12years); Materials: 1) Alarm systems: $24,450; 2) Feed & medications: $7,500; 3) Marking materials: $9,350. Source: Communications with Tim Tynan, Joseph Hinton, and Caroline Peterschmidt, 16 May 2007.

xxvii. Estimate: $34,100 * 12 years. Source: Communications with Tim Tynan, Joseph Hinton, and Caroline Peterschmidt, 16 May 2007.

xxviii. Estimate: Weir placement and removal: $2,250 annually (6 FTEs @ $125.00/day x 3 days/year); Weir monitoring and operation: $6,600 annually (0.4 FTEs @ $165/day x 100 days/year); Weir data collection and evaluation: $13,600 annually (1 FTEs @ $170/day x 80 days/year); Report writing: $3,920 (1 FTE @ $280/day * 14 days/year). Materials: 1) VCR tapes: $120/year; 2) Underwater camera: $200/year; 3) Misc repair and replacement parts: $400/year; 4) Weir replacement cost: $5,000 (VERY rough estimate); 5) Other costs: $4,500 (one time costs of viewing chamber + computer & VCR equipment estimate); Travel costs: Unknown (1 vehicle * 80 miles round trip daily * $0.35/mile * Unknown number of days). Source: Communications with Tim Tynan, Joseph Hinton, and Caroline Peterschmidt, 16 May 2007.

xxix. Estimate: Trap placement and removal: $3,840 annually (4 FTEs @ $240/day x 4 days/year); Trap monitoring and operation: $8,100 annually (1 FTEs @ $180/day x 45 days/year); Trap data collection and evaluation: $3,920 annually (1 FTEs @ $280/day x 14 days/year); Materials: 1) Misc supplies (paper, nets, waders, batteries): $300/year; 2) Smolt trap repair and maintenance: $400/year; 3) With Calcein monitoring, one-time cost Calcein detection light and special glasses: $3,600; 4) Screw Trap one time cost: $25,000; Travel costs: Unknown (1 vehicle * 80 miles round trip twice daily * $0.35/mile * Unknown number of days). Source: Communications with Tim Tynan, Joseph Hinton, and Caroline Peterschmidt, 16 May 2007.

xxx. Estimate: Beach surveys: $3,200 annually (3 FTEs @ $213/day x 5 days/year); Tributary surveys: $7,200 annually (2 FTEs @ $180/day x 20 days/year); Survey data collection and stock status assessment: $1,120 annually (1 FTEs @ $280/day x 4 days/year); Materials: 1) Waders and raingear, msc supplies: $500/year; 2) Boat operations and maintenance for beach surveys: $400/year; 3) Wetsuit and associated gear one time cost: $500; 4) Assessment of otolith thermal marks: $3,000/year ($15/sample, 200 samples/year); Travel costs: Unknown (1 vehicle * 80 miles round trip per survey day * $0.35/mile * Unknown number of days); Miscellaneous: Any analyses of genetic information collected would be additional cost at approximately $45/sample. Source: Communications with Tim Tynan, Joseph Hinton, and Caroline Peterschmidt, 16 May 2007.